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ABSTRACT

A labor market study of implications of rapid energy development in the West examined the dimensions of work force movement from secondary occupations to primary energy occupations in areas affected by "boom town" growth. (Secondary occupations were defined as those in all industries not categorized as primary energy industries.) Focus was on the magnitude of transference from secondary to primary industries, types of secondary occupations and skills most likely to transfer, degree to which secondary workers make occupational changes when changing industries, and types of secondary occupations which are constantly and critically in short supply as a result of primary energy development. The analysis was based on existing data sources and research previously conducted in "boom town" areas. Selected findings include the following: High turnover rates were experienced in both primary and secondary sectors. New entrants into the labor force played a major role in job growth (4% of energy workers, 20% of secondary sector workers). Job switching from secondary to primary sector was common and usually involved upward occupational shifts. Shortages occurred in secondary occupations as over half the energy sector jobs came from transference from the secondary sector. (Shortage occupations are listed by Dictionary of Occupational Titles (DOT) codes. Implications for training resource allocation and career guidance activities are suggested.) (JT)

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SECONDARY WORK FORCE MOVEMENT INTO ENERGY INDUSTRY EMPLOYMENT IN AREAS AFFECTED BY "BOOM TOWN" GROWTH

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Colorado State Occupational Information Coordinating Committee
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PREFACE

This report was originally prepared as an internal document when the author was a Labor Economist for Region VIII of the U.S. Department of Labor in Denver. The continuing interest in planning for the impact of energy development on the need for education and training programs has prompted us to publish this paper. It is hoped that the data presented here will make it clear that planning for education and training programs should not discount the importance of the "secondary work force" as a key to upward occupational mobility for many persons. Furthermore, this report indicates that resource allocation for training and placement activities should be balanced between primary energy occupations which require intensive training, and those in selected secondary occupations.

We think that this study has profound implications for training resource allocation, as well as career guidance activities in areas undergoing energy development.

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The socioeconomic implications of rapid energy development in the west have been well documented. Studies have borne out the details of the "boom town" syndrome; i.e., lack of infrastructure to service increased populations, lack of adequate housing, schools and the deterioration of the quality of life. The impact of these factors on labor turnover and absenteeism has been critical.

The labor market study of areas affected by energy expansion conducted by the University of Utah in 1976 concluded that the source of operational and construction manpower had been primarily regional, that manpower shortages were occurring in skilled occupations in primary energy industries and that areas where manpower shortages were consistently realized were in secondary and induced demand sectors.[1] It was very apparent in rapidly expanding areas within the Region that much of the existing local labor force was being drawn into primary energy industries. High wages and the potential for long term employment and career advancement were the primary incentives. The result of this movement was occupational shortages in non-energy industries in the local areas.

The objective of this research effort is to ascertain the dimensions of work force movement from secondary occupations to primary energy industry occupations in areas affected by "boom town" growth. In particular, we are interested in the magnitude of the transference from secondary to primary industries, the types of secondary occupations and skills most likely to transfer, the degree to which secondary workers make occupational changes when changing industries, and the types of secondary occupations which are constantly and critically in short supply as a result of primary energy development.

By design, the project drew from existing data sources and research previously conducted in "boom town" areas. The following data sources were used in this project:

The Construction Worker Profile - Mountain West Research, Inc.

The Construction Worker Profile was conducted for the Old West Regional Commission in 1975 to study the socioeconomic consequences of the construction of energy-related facilities in the Rocky Mountain Region. Primary data were collected from an interviewer-conducted survey involving 1,432 households and from self-administered questionnaires at 14 major construction sites which produced 3,168 responses.

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*Secondary work force, for purposes of this report, is defined as all other industries not categorized as primary energy industries and all occupations within such industries.

[1]Joe Baker and Kathy Workman, Labor Market Information for Expanding Energy Production, USDL, ETA, research grant, Denver, CO. Dec. 1976

Questions used in the household survey were quite extensive and elicited responses to some 200 variables. However, in the coding of these responses as transcribed onto computer tape, only one-digit occupational classifications were used. To produce a greater occupational detail, it was necessary to refer to the original questionnaire forms and extract actual responses to questions about previous and current occupations.

Regional Coal Related Work Force Characteristics: North Dakota, Montana and Wyoming

The Department of Agricultural Economics at North Dakota State University conducted several surveys during the period 1974 through 1976 to determine the socioeconomic characteristics of workers at seven coal mines and six electric generating plants in North Dakota, Montana and Wyoming. A total of 753 out of a total 1,361 employees, or 55 percent, responded to the questionnaire.

Wyoming State Job Service ESARS Reports

ESARS Table 12, "Applicants in Non-Agricultural Job Openings by Occupation", were obtained for the Casper, Rock Springs and Gillette, Wyoming, local offices.

Rock Springs "Rocket Miner" Newspaper Classified Ads

Classified employment ads from 1971-1973 were coded and compiled to be used as indicators of secondary sector labor demand.

A considerable amount of synthesizing data from the above-mentioned sources was done in order to direct a primary focus on the characteristics of the secondary work force in expanding energy areas. Data from the Construction Worker Profile was intentionally geared for computer retrieval to facilitate selective research ventures such as the one conducted. Difficulties related to the use of different questionnaire designs for different survey areas prevented a systematic retabulation of the micro-data from the Regional Coal-Related Work Force Study. Likewise, local area ESARS computer data tapes for the time periods in question were not available.

Summary of Findings

The following capsulizes the analysis of the Construction Worker Profile data:

1. In spite of a rise in the proportion of energy-related jobs to total jobs, almost 60% of employed household heads and 90% of employed spouses were in the "secondary" work force.

2. High turnover rates were experienced in both the primary and secondary sectors.

3. New entrants into the labor force played a major role in job growth. Among those employed, nine percent of household heads and 41 percent of spouses were recent entrants into the labor market.

4. New entrants in the labor force accounted for only four percent of total energy workers but nearly twenty percent of total workers in the secondary sector.

5. The labor force participation rate among heads of household was quite high (nine percentage points above the U.S. average), due to a higher proportion of persons without families present.

6. The labor force participation rate among spouses was quite low (21 percent vs. 46.4 nationally) because of (a) a higher proportion of families with pre-school children, (b) higher family incomes, and (c) a transient life style which inhibits labor force participation.

7. Job switching from the secondary to the primary sector was common and was usually associated with increased wages.

8. Job switching from a secondary to a primary industrial sector usually involved occupational shifts.

9. Within the secondary sector, job switches were associated with upward occupational shifts.

10. Nonconstruction newcomers normally had higher educational attainment and filled a significant number of professional, managerial and technical jobs.

11. Shortages in some secondary occupations were manifest as over half the jobs in the energy sector came from transference from the secondary sector, leaving voids in the secondary sector.

The base data indicated that shortages existed in some 100 occupations. Some of these occupations were basic occupations in the service and trade sectors and therefore easily classifiable as "secondary" occupations. Nevertheless, the majority of listed occupations could very well have been in either the "primary" or the "secondary" sector, depending upon the industry of employment.

It was evident from the data that for typically "primary energy occupations" shortages were severe. However, since the data was stratified only by type of occupation, relative severity of shortages in the primary versus the secondary sectors was not readily apparent. The literature, however, suggests that because of the wage differentials between the secondary and

primary sectors, the inducement to transfer into the high paying energy sector was very great. This resulted in very high rates of turnover in many secondary occupations.[2] This phenomenon also left serious voids in some types of services necessary in the community at large. Plumbers, carpenters, mechanics, electricians, truck drivers, repairmen and laborers were drawn into the primary sector, causing a shortage for their services in the non-energy sector and in the community at large.

Characteristics of the Energy Worker[3]

The construction of large energy-related facilities in the Rocky Mountain Region precipitated an immense increase in energy-related jobs and an accompanying growth in the secondary sector. The labor force statistics for the period 1970-1975 for the nine communities specified in the Construction Worker Profile indicate that while energy-related jobs grew at a very fast rate (and in some cases, spurted up to 12 times the normal pre-boom level), the secondary sector remained a very potent force.

The proportion of energy-related jobs to total jobs increased, but even with the energy boom, a full 60 percent of employed household heads and 90 percent of employed spouses were in the "secondary" workforce. In absolute terms, the secondary sector was producing between two to three times the number of new jobs gained in the energy sector and was playing a major role in providing workers for some of the primary occupations. Among employed household heads, over half of those with jobs in the energy sector had transferred from the secondary sector.

The growth in job opportunities in the boom areas was also accentuated by high turnover rates. In the primary sector, particularly in the case of the Rock Springs-Green River development, the high turnover rates experienced in the construction work force were unexpected. Hiring levels for construction workers had to be expanded to accommodate the replacement needs. This in turn produced an accelerated flow of workers from the secondary work force.

During the period 1970-1975, the total population almost doubled for the nine communities surveyed by the Construction Worker Profile study. With the aggregate population rising from 31,000 to 60,000 during the five-year period,[4] the total labor force also grew tremendously.

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[2] See, for example, interviewing results described in Mountain West Research, Inc., Construction Worker Profile Community Report: Rock Springs and Green River, Wyoming (A study prepared for the Old West Regional Commission, December 1975), p. 79.

[3] The material in the following three sections represents a distillation of particular elements in the Construction Worker Profile data as they related to the Secondary Work Force Study. In addition, special tabulations from the Construction Worker Profile data base were made and analyzed.

[4] 1970 population figures are as stated in the 1970 census, 1975 figures are from The Construction Worker Profile, User's Guide, p. 3

TABLE 1

CURRENT AND PREVIOUS INDUSTRY CLASSIFICATIONS OF WORKERS IN THE TOTAL SAMPLE, CONSTRUCTION WORKER PROFILE, 1975

Industry Classification	Household Heads (Percent) Previous Jobs	Household Heads (Percent) Current Jobs	Spouses (Percent) Previous Jobs	Spouses (Percent) Current Jobs
Agriculture	6.6	3.6	0.2	0.3
Mining	7.0	12.3	0.2	0.8
Energy-related construction	13.5	25.6	0.0	0.4
Non-energy related construction	14.6	7.6	0.2	0.3
Manufacturing	4.0	2.9	0.3	0.1
Transportation and public utilities	10.5	12.0	0.4	1.5
Wholesale trade	0.8	0.8	0.1	0.1
Retail trade	9.3	6.8	2.8	4.8
Finance, insurance and real estate	1.1	1.7	0.8	1.0
Personal services	3.1	2.2	1.0	2.2
Health-recreation	1.0	1.3	1.3	3.1
Professional and educational services	6.1	6.7	2.7	4.9
Public administration	1.8	2.0	0.4	0.6
Armed forces	0.6	0.8	0.7	0.3
Student	6.9	0.1	1.1	0.1
Unemployed	0.0	1.8	0.0	0.0
Other	13.1	11.8	87.7	79.5
TOTAL	100.0	100.0	100.0	100.0

Source: Special tabulations from the Construction Worker Profile data base

New entrants into the labor force played a major role in providing the labor supply in the study area. Aside from the usual cohort of new labor force entrants recently attaining working age, the study showed that a significant number of workers were being drawn from household heads and spouses who had no labor force attachment. It showed that among those employed, nine percent of household heads and 41 percent of spouses had no immediately previous job.

Labor Force Participation Rates

The labor force participation rates among heads of household were quite high at 89.4 percent. This was some nine percentage points above what the U.S. average was for 1975, which one could expect under boom conditions where people with marginal labor force attachment are attracted to jobs. However, the high labor force participation rate among heads of household appears to be better explained by a very high proportion (51 percent) of workers who were single, widowed, divorced, or who were married and had families absent.

For all spouses, the labor force participation rate was extremely low at 21.0 percent compared to the national average of 46.4 percent at that time. And for newcomer construction workers' spouses, the labor force participation rate was lower still, at 12 percent.[5] This phenomenon was common among all the energy-affected communities in the study.

However, the low participation rate among spouses appears to be explainable through several factors.

1. A significantly higher percentage of families had children under six years of age (40 percent in the Rock Springs-Green River area versus 27 percent nationally).

2. Relatively high median family incomes ($17,700 for construction workers versus $12,500 nationally in 1975).

3. A transient life style which inhibits labor force participation. (About 40 percent of all construction workers had plans to leave.)

4. Especially among spouses of construction workers, the educational attainment level was significantly lower than the national average, producing a disadvantage in the labor market.

Job Switching

The design of the Construction Worker Profile questionnaire permitted a longitudinal focus on the phenomenon of job switching among workers in energy areas. The survey data base supported the hypothesis that job switching was typically motivated by higher wages. However, there were frequent instances in which the primary motivation mentioned was "better job satisfaction."

Job switching, in general, occurred frequently. In the survey, 25 percent of household heads stayed within the same industry, though they may have switched employers and/or jobs within the same industry. In spite of a significant incidence of job switching, close to half of the same group of household heads maintained the same occupational category.

Job switching within the secondary sector or from a secondary industry to a primary industry usually involved occupational shifts. These occupational shifts within the secondary sector were usually upward shifts associated with more skill and specialization. However, a significant number of those who switched to become construction workers and especially workers in mining operations involved people with substantial training in other fields.

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[5]Construction Worker Profile, Summary Report, p. 11

TABLE 2
INCIDENCE OF JOB SWITCHING BY HOUSEHOLD HEADS

CURRENT JOB	PREVIOUS JOB: Out of Labor Force	PREVIOUS JOB: Energy Related	PREVIOUS JOB: Secondary	PREVIOUS JOB: Total
Out of Labor Force	3	1	4	8
Energy Related	17	221	301	539
Secondary	111	71	703	885
Total	131	293	1008	1432

Within the primary sector, and especially for construction workers, job switches normally meant that the previous job was terminated. Most of these switches actually involved transfers or physical moves and did not usually involve occupational shift. Throughout the survey area, many workers who had come to work on the construction phase stayed on to work in either coal mining or in operation of energy facilities. Close to 23 percent of all household heads with current jobs listed in mining had transferred from the construction industry.

TABLE 3
PREVIOUS INDUSTRY CLASSIFICATION
FOR COAL MINING EMPLOYEES, CWP, 1975

Industry Classification Previous Job	% with Current Mining Jobs
Agriculture	2.3
Mining	33.5
Construction	22.7
Manufacturing	7.4
Transportation & Public Utilities	5.7
Wholesale & Retail Trade	6.3
Finance, Services & Government	6.3
Unemployed or not in labor force	15.9
TOTAL	100.0

Source: Special tabulations from the Construction Worker Profile data base.

Job Switching from the Secondary Sector

The focal point of this study involves job switching from the secondary to the primary sector. As mentioned earlier, over half (actually 55%) of energy workers had switched from a secondary industry. This involved about 30 percent of the total secondary work force. Because of the typically large wage differential in the primary sector versus the secondary sector, these shifts caused substantial income gains for those involved.

Nevertheless, the incidence of job switching from a secondary to an energy-related construction job was more prevalent among newcomers than among long time (pre-boom) area residents. While this may suggest that no special preference was being given to local residents, another hypothesis appears more plausible. Especially in the Rock Springs case where the energy facility was 30 miles away, and especially for construction jobs which were typically of short duration, locals may have actually preferred the more stable local jobs as long as incomes were rising reasonably fast. (In 1975, the median household income for long-time Rock Springs residents rose to about 17 percent above the national average.)

Construction jobs did not appear to hold a special attraction for long-time residents of Rock Springs and Green River, but jobs in mining appeared to be very much in demand.[6] Long time residents appeared to prefer mining jobs because of their relative stability compared to construction jobs. As a result, a significant number (20.8 percent) of long time residents who were heads of households had mining jobs. In contrast to the construction experience, long time residents appeared to have the "inside track" in terms of obtaining mining jobs.

TABLE 4
INDUSTRY OF EMPLOYED HOUSEHOLD HEADS
ROCK SPRINGS, WYOMING*

Industry	Percentage of Employed Household Heads	
	Long Time Residents	Newcomers
Agriculture	1.3	1.0
Mining	20.8	4.7
Construction:		
Jim Bridger Plant	1.3	17.9
Other energy-related	3.9	24.9
Non-energy related	10.4	11.5
Manufacturing	6.5	0.7
Transportation, Utilities, Communications	22.1	18.7
Wholesale Trade	---	0.7
Retail Trade	10.4	5.7
Finance, Insurance, Real Estate	3.9	1.3
Personal Services	5.2	1.7
Health and Recreation	3.1	1.3
Professional and Educational Services	7.8	7.7
Public Administration	2.6	2.3
TOTAL	100.0	100.0

*Retired and unemployed persons and students were not included in this analysis.

Source: Construction Worker Profile, Community Report, Rock Springs and Green River, Wyoming, p. 22

[6]Between 1972 and 1974, mining jobs in Sweetwater County rose from 1,354 to 3,092, an increase of 130 percent. Annual mining payrolls amounted to over $42 million, averaging $13,700 per worker. County Business Patterns for Wyoming, U.S. Department of Commerce, 1972 and 1974.

Transferability of Skills

As evidenced in the data from the survey of coal mining operatives, locals were more able to obtain jobs in these facilities than in construction locations. Jobs in mining and electric generating operations were actually preferred by locals, and it also appeared that there were more instances of transfers from the secondary sector to the mining and operations activity than to skilled construction occupations. However, most construction occupations were readily transferable to mining activities so that there was a high propensity for construction workers to switch to the mining sector.

In the 395 sampled cases of Wyoming coal mining workers,[7] a direct correlation of skills from previous to current jobs is apparent (see table 5). Mechanics, welders, carpenters, electricians and engineers appeared to have maintained the same occupational classification through the job switch. Of special interest is the apparent upgrading of some workers formerly classified as "general laborers" and "office workers" into occupations classified under "equipment operators". To what extent this phenomenon is tied to job requirements being modified downward in the case of a tight labor market or to acquired workers skills is unknown, however.

TABLE 5
PRESENT VERSUS PREVIOUS JOB CLASSIFICATIONS IN COAL MINING
WYOMING SAMPLE, 1976*

	Present Job		Previous Job	
	Number	Percent	Number	Percent
Equipment operator	199	50.4	90	22.8
Dragline or Shovel Operators	29	7.3	na	----
Dozer and Equipment Operators	88	22.3	na	----
Control and Auxiliary Operators	82	20.8	na	----
Driller or Shooter	18	4.6	na	----
Operating Technicians	na	----	37	9.4
General Laborers	31	7.8	60	15.2
Mechanics, Welders, Carpenters	71	18.0	68	17.2
Electricians, Engineers, Boiler Attendants	31	7.8	30	7.6
Manager, Foreman	24	6.1	na	----
Office and Management Personnel	na	----	84	21.3
Others	21	5.3	26	6.6
TOTAL	395	100.0	395	100.0

*derived from "Regional Operating Worker Profile: North Dakota, Montana and Wyoming", tables 19, 21, 28, and 30.

[7]The data represent a combination of the worksite surveys in Rock Springs and Glenrock, Wyoming, as described in the Regional Coal-Related Work Force Characteristics: North Dakota, Montana and Wyoming, (North Dakota State University, 1977)

Local versus Non-Local Composition of the Labor Force

Mining Workers

Typically, local workers were more highly represented in the coal mining industry than nonlocals. An average of about 65 percent of all mining employees were local residents although the range was from 82.2 percent in North Dakota to a low of 46.9 percent in Rock Springs.[8]

Construction Workers

For the construction work force, close to 40 percent were local; i.e., previous addresses were in the same area. For the 14 projects in the CWP survey, the local share of the total work force ranged from 3.2 percent to 78.6 percent. The survey indicated some meaningful hypotheses which produced statistically significant results as determinants of labor supply sources. For example:[9]

1. The number of local workers supplied by a community to a project is positively related to the size of the community.

2. The number of local workers supplied by a community to a project is positively related to the size of the project,

3. The number of local workers supplied by a community is inversely related to its distance to the project, and

4. The larger the total population of all communities within the project's commuting region, the smaller the number of local workers supplied by a local community. This hypothesis takes into account competing sources of labor supply to the area.

Hypotheses regarding the influence of wage level differentials as a determinant of the degree of inducement of local labor to the project were not statistically substantiated. However, the problem may be more due to a lack of conceptually consistent income data than to a lack of actual relationship.

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[8] Regional Coal-Related Work Force Characteristics, op. cit., p. 11

[9] The hypotheses restated here are those hypotheses which are statistically supportable as described in the Construction Worker Profile Summary Report, p. 20 and the Regional Coal Related Work Force Characteristics, p. 42.

TABLE 6

LOCAL WORKERS AS A PERCENTAGE OF TOTAL WORKERS *

Project Number and Name	Total Workers Responding	Local Workers	Percentage Total
Construction Projects			
1 Coronado 1, 2, 3	119	48	40.3
2 Craig 1, 2 -- Yampa Power Plant	307	129	42.0
3 Hayden 2	483	155	32.1
4 Colstrip 1, 2	161	62	38.5
5 Center--Milton R. Young	73	35	47.9
6 Leland Olds	193	86	44.6
7 San Juan 1	234	184	78.6
8 Emery	130	69	53.1
9 Huntington 2	307	142	46.3
10 Jim Bridger 2, 3	503	149	29.6
11 Texaco Lake Expansion	206	86	41.7
12 Sun Oil--Cordero Mine	133	57	42.9
13 Texas Gulf Sulphur	227	59	26.0
14 Wyodak	92	3	3.2
Subtotal	3,16?	1,264	39.9
Coal Mining Operations			
15 North Dakota Projects	241	198	82.1
16 Rock Springs WY	241	113	46.7
17 Glenrock WY	154	94	61.0
18 Decker MT	116	81	69.8
Subtotal	752	486	64.6
Total--Energy Sector	3,920	1,750	44.6
Secondary Work Force			
Rock Springs WY	253	76	30.0
Green River WY	106	64	60.4
Total	259	140	39.0

*compiled from Construction Worker Profile, summary report, Regional Coal-Related Work Force Characteristics and CWP Special Tabulations.

A likely hypothesis regarding the local/non-local composition of the work force appears to be tied to the nature of the energy facility. The construction phase appears to have a higher complement of non-local workers compared to the operating phase. The operations of the energy generating or mining facilities appear to attract more locals because of the relative stability of the job and because of high wages.

Locals appeared to commute longer distances to project sites, compared to non-locals. However, it seems plausible that newcomers, given the flexibility of locating their residences, reside in areas which would be nearer to the worksite. Locals, the majority of whom owned homes, did not typically have this option and thus tended to commute farther.

Conclusions drawn from the Rock Springs-Green River data base show that there generally appears to be a significant difference in the local/non-local composition of the labor force in the primary versus the secondary work force. Among household heads employed in the secondary work force, 39.0 percent were local residents versus 28.5 percent for those working in the energy facilities.

Shortage Occupations - Construction

The construction work force survey was able to determine the composition of local versus non-local workers by occupation. The basic question read, "Are you living in the same town you lived in before you started working on this job?" A "yes" answer assumed a move to the area to work at the facility. It meant that the worker was part of a non-local supply of workers who were either attracted or recruited to the area.

A total of 723 respondents in the survey of construction workers at the Jim Bridger and Texas Gulf facilities in the Rock Springs-Green River area was enumerated. The results for this area indicate for almost all of the occupations listed, the majority of workers had to come from outside the area. Especially in the supervisory, professional and skilled craftsman occupations, non-locals tended to dominate. The local labor supply appeared to be able to provide a significant portion of the work force for surveyors, laborers, and operating engineers. For the latter jobs there appeared to be some transferability of skills from secondary occupations to primary sector occupations.

Shortage Occupations - Mining

Shortages in mining occupations were indicated by those jobs which local residents could not typically fill. Data from the Operating Work Force Survey indicate that for the skilled [illegible] semi-skilled job classifications--for example, for electricians, engi[illegible] and boiler attendants--possible shortages might exist. This is also true for managers and foremen, many of whom are brought in from other company operating sites.

TABLE 7

OCCUPATIONS OF LOCAL VS. NONLOCAL WORKERS
JIM BRIDGER AND TEXAS GULF PROJECTS
(CONSTRUCTION PHASE)

SWEETWATER COUNTY, WYOMING

Occupation	Percentage of Occupation Group: Local Workers	Nonlocal Workers	Percent Total	Raw Total
Superintendent	---	100.0	100.0	24
Foreman	29.4	60.6	100.0	34
Engineer	23.1	76.9	100.0	52
Surveyor	50.0	50.0	100.0	6
Ironworker	15.5	84.5	100.0	58
Cement Finisher	---	100.0	100.0	9
Millwright	25.0	75.0	100.0	8
Pipefitter	16.3	83.1	100.0	98
Electrician	25.0	75.0	100.0	88
Painter	20.0	80.0	100.0	5
Carpenter	32.3	67.7	100.0	62
Plumber	33.3	66.7	100.0	6
Mechanic	60.0	40.0	100.0	5
Sheet Metal Worker	---	100.0	100.0	1
Welder	33.3	67.7	100.0	9
Laborer	43.8	56.2	100.0	80
Helper	30.0	70.0	100.0	30
Winterizer	---	100.0	100.0	4
Operating Engineer	52.8	47.2	100.0	53
Oiler	100.0	---	100.0	8
Truck Driver	30.0	70.0	100.0	10
Warehouseman	33.3	67.7	100.0	6
Safety	---	100.0	100.0	2
Office Worker	37.3	62.7	100.0	59
Other	---	100.0	100.0	5

Compiled from base data represented in table 2 and table 6, Construction Worker Profile, Rock Springs and Green River, p. 5 and p. 8

TABLE 8
PRESENT JOB CLASSIFICATION OF LOCAL AND NON-LOCAL COAL INDUSTRY EMPLOYEES, NORTH DAKOTA 1974 AND WYOMING 1976

Present Job Classification	Local		Nonlocal	
	Number	Percent	Number	Percent
Control and Auxiliary Operators	47	11.6	50	21.6
Dragline or Shovel Operators	34	8.4	11	4.8
General Laborers	64	15.8	13	5.6
Mechanics, Welders, Carpenters	60	14.8	40	17.3
Electricians, Engineers and Boiler Attendants	21	5.2	30	13.0
Managers and Foremen	40	9.9	24	10.4
Dozer and Equipment Operators	92	22.7	37	16.0
Driller or Shooter	9	2.2	9	3.9
Accountants and Office Personnel	9	2.2	6	2.6
Miscellaneous	29	7.2	11	4.8
TOTAL	405	100.0	231	100.0

Compiled from tables 12, 21, and 30, Regional Coal-Related Workforce Characteristics

Shortages in Specific Occupations: ESARS Data[10]

Total registered applicants for the Wyoming ES local offices of Gillette and Casper doubled in volume between 1973 and 1975. The same kind of increase was experienced in the Rock Springs office between 1972 and 1974 when the employment peak occurred.

Between the pre-boom period and the peak, the proportion of females among total applicants rose from 34 percent to 40 percent. The proportion of youth applicants (under 22 years of age) rose to number about 38 percent of the total.

In order to arrive at indicators of occupation-specific shortages in the secondary work force, a qualititative assessment of the different data bases was made. First of all the notion of "shortages" has to be defined.

While alternative indicators of shortages could be described, for the purposes of this report the following represents the definition of a

[10]The data presented in this section represents an analysis of the ESARS data, table 96.

labor shortage. An occupational shortage exists if: (1) the ratio of ESARS job orders to applicants rises significantly above traditional levels in a particular occupation, or (2) the volume of job advertisements in local newspapers related to the specific occupation is significantly above normal levels; or (3) indications are such that new workers would be hired immediately if they were available.

Using this general definition of occupational shortage, a list of shortage occupations by D.O.T. codes was compiled. Further to give some quantification to the notion of shortages, the ESARS job orders to job applicant ratios by specific occupation were examined during the peak period. These ratios were compared with the latest Regional 12-month average ratios which are taken to be more typical of a "normal" year. Occupations which experienced a significant increase in the volume of job applicants and job orders were assessed.

Four shortage categories were delineated. Category A describes occupations which had a significant volume of job order and job application transactions in the local energy areas but where no shortage was apparent. Category B describes occupations where a significantly high job order to job applicant ratio existed for the local area vis-a-vis the six-state Federal region, but where the ratio was not greater than one. This typified the concept of a "moderate" shortage. The third category, C, describes the extreme occupational shortages in the local labor area (job order to applicant ratio greater than one) but also a situation where the pool of available labor within the Federal region VIII would suffice. Category D describes extreme shortages in both the local energy areas and the six-state region and would indicate occupations where out-of-region immigration would have to take place.

TABLE 9
OCCUPATION-SPECIFIC LIST OF SHORTAGES

Dictionary of Occupational Titles 3-Digit Code	Occupational Title	Peak Yr. Ratio Job Orders/ Applicants	Fed. Region VIII Ratio Job Orders/ Applicants 9-30-77	Index of Shortages
000	All occupations	na	.49	--
003	Electrical Engineer	.75	.26	B
007	Mechanical Engineering	.52	.44	B
010	Mining & Petroleum Engineering	2.00	.83	C
017	Draftsmen	1.17	.45	C
018	Surveying Occupations	4.17	.56	C
020	Occupations in Mathematics	.44	.40	A
024	Geologists	.73	.11	B
029	Occupations in Mathematics & Physical Science	1.00	.28	B
045	Occupations in Psychology	.57	.26	B
079	Medical Assistants	.833	.26	B
099	Occupations in Education	1.50	.28	C
160	Accountants	1.00	.27	B
166	Personnel Administration	.50	.54	A
169	Occupations in Administration	1.20	.20	C
187	Business Agents	1.25	.24	C
189	Managers & Officials	1.33	.35	C
195	Occupations in Social & Welfare Work	2.00	.35	C
201	Secretary	2.36	.48	C
202	Stenographer	1.56	.77	C
206	File Clerk	2.00	.52	C
209	Clerk/Typist	1.57	.55	C
210	Bookkeeper	1.91	.37	C
211	Cashier	1.23	.27	C
213	Automated Data Processing Equipment Oper.	2.29	.53	C
219	Computing & Account Record Keeping	2.28	.41	C
222	Shipping & Receiving Clerks	1.27	.41	C
223	Stock Clerks	2.84	.63	C
235	Telephone Operator	4.40	.42	C
237	Receptionists & Information Clerks	1.88	.40	C
239	Info & Message Distribution Occupations	5.00	2.09	D
249	Misc. Clerical Occupations	3.00	1.07	D
250	Salesmen, Real Estate & Insurance	5.00	.73	D
289	Salesmen, Salespeople, Commodities	2.56	.33	C
290	Sales Clerk	1.96	.32	C

TABLE 9
OCCUPATION-SPECIFIC LIST OF SHORTAGES

Dictionary of Occupational Titles 3-Digit Code	Occupational Title	Peak Yr. Ratio Job Orders/ Applicants	Fed. Region VIII Ratio Job Orders/ Applicants 9-30-77	Index of Shortages
292	Routemen	6.00	.77	C
293	Canvassers & Solicitors	7.50	4.25	D
299	Merchandising Occupations	4.80	.39	C
301	Day Workers	5.78	1.61	D
304	Housemen & Yardmen	1.22	3.09	D
306	Maids, Domestic	5.00	.85	C
307	Nursemaids	3.96	1.03	D
309	Domestic Service Occupations	3.00	1.95	D
311	Waiters, Waitresses & Related Occupations	3.33	.75	C
312	Bartenders	1.42	.29	C
313	Chefs & Cooks, large hotels & restaurants	.62	.52	A
314	Chefs & Cooks, small hotels & restaurants	2.56	.66	C
316	Meatcutters	10.00	.27	C
318	Kitchen workers	3.12	.83	C
323	Maids & Housemen, hotels & restaurants	3.36	.99	D
355	Attendants in hospitals & morgues	1.41	.35	C
361	Laundering Occupations	7.50	1.09	D
372	Guards & Watchmen	4.50	.66	C
375	Policemen & Detectives, Public Service	2.67	.36	C
381	Porters & Cleaners	3.33	1.19	D
382	Janitors	4.22	.61	C
407	Gardening & Groundskeeping Occupations	4.20	1.82	D
503	Metal Processing	11.00	1.03	D
549	Processing of Petroleum, Coal, Natural Gas	11.67	1.59	D
559	Processing of Chemicals, Plastics, Synthetics	12.00	.65	D
600	Machinists & Related Occupations	3.00	.32	C
620	Engineering Equipment Mechanics	1.63	.40	C
625	Engine, power transmission & related mechanics	2.18	.45	C
629	Industrial Machinery Mechanics	6.00	1.63	D
638	Misc. Occupations in Machine Installation	3.32	.44	C
699	Misc. Machine Trades Occupations	1.00	.26	C
726	Assembly & Repair of Electric Components	7.20	.67	C
804	Tinsmith, Coppersmith, Sheet Metal Worker	1.83	.48	C
807	Bodymen, Transportation Equipment	1.00	.55	C
810	Arc Welders	2.15	.36	C
812	Combination Arc & Gas Welders	.90	.25	B
819	Welders & Flame Cutters, Related Occupations	10.00	.42	C

TABLE 9
OCCUPATION-SPECIFIC LIST OF SHORTAGES

Dictionary of Occupational Titles 3-Digit Code	Occupational Title	Peak Yr. Ratio Job Orders/ Applicants	Fed. Region VIII Ratio Job Orders/ Applicants 9-30-77	Index of Shortages
821	Repair of transmission	4.00	.22	C
824	Repair in lighting equipment	9.16	.20	C
829	Repair of electrical equipment	8.00	.25	C
840	Construction & Maintenance Painters	4.33	.72	C
842	Plasterers & Related Occupations	1.20	.65	C
844	Cement & Concrete Finishing	1.38	.58	C
850	Excavating, Grading, & Related Occupations	2.42	.46	C
859	Excavating, Grading, Paving & Related Occup.	.69	.15	B
860	Carpenters	.72	.52	B
861	Brick & Stone Masons & Tile	4.20	.52	C
862	Plumbers, Gas Fitters, Steam Fitters, etc.	9.42	.53	C
866	Roofers & Related Occupations	7.00	1.13	D
869	Misc. Construction Occupations	1.97	.63	C
899	Misc. Structural Work Occupations	5.91	.82	C
902	Dump Truck Drivers	4.00	.41	C
905	Truck Drivers, Heavy	1.44	.31	C
906	Truck Drivers, Light	.62	.51	B
909	Motor Freight Occupations	6.00	3.43	D
913	Passenger Transportation Occupations	7.00	.57	C
915	Gas Station Attendants & Servicemen	1.53	.84	C
919	Misc. Transportation Occupations	2.67	1.83	D
920	Packing Occupations	1.05	.65	C
922	Occupations in Moving & Storing Materials	3.15	.58	C
929	Packing & Materials Handling	5.34	2.34	D
930	Boring, Drilling, Cutting, etc.	3.95	.57	C
939	Occupations in Extraction of Minerals	10.13	.68	C
950	Stationary Engineers	2.60	.30	C

*A=Minor or no shortage in local area and in region
B=Moderate shortage in local area compared to region
C=Extreme Shortage in local area but not in region
D=Extreme Shortage in local area and in region

Implications of the Newspaper Want Ad Survey

The Rock Springs Daily Rocket Miner - Job Want Ads were surveyed between September 1971 and August 1973. The fall of 1971 was generally considered the start of the construction boom in Rock Springs, Wyoming, and 1973 was about the middle of it.

Want ad data are generally deficient for use as a primary data base since the information presented in the want ads is usually insufficient. First of all, recruitment may be for a non-local area without explicitly saying so. Also, the quantification of the number of available jobs in the same occupational area is impossible because ads may be repeated over a period of time and may not necessarily say how many workers are needed. This is especially true for occupations with high turnover, such as gasoline station attendants and waitresses.

The primary intent was to get a feel for the manifestations of the boom as it might relate to a local area resident whose main job information source would be the newspaper. A general observation from the Rock Springs want ad study is that it does not appear that employers made full use of the local newspaper for recruitment. This hypothesis is supported by the fact that jobs at the Jim Bridger plant were advertised in union magazines even before Rock Springs residents knew about the project.[11] Since the union hiring halls were not located in Rock Springs, it made it very difficult for local residents to find out very much about the developments.

Nevertheless, it seemed that the occupational pattern of the want ads appeared to be chronologically associated with the development of the project. At the very beginning, emphasis of the ads were for food service and gasoline station attendants; these were followed by job ads for surveyors and construction workers, then by field engineers, miners and mine maintenance workers. Nonconstruction professional occupations like teachers, planners, and nurses were recruited somewhat after the boom had started.

Towards the fall of 1973, job ads for energy jobs started to mention "equal opportunity employer". This leads to the implication that some employers were finding it hard to fill minority quotas for certain jobs and had begun advertising in the local newspaper.

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[11] Construction Worker Profile, Community Report, Rock Springs, Green River, page 22

APPENDIX
CURRENT AND PREVIOUS OCCUPATIONS FOR
PERSONS WHO SHIFTED FROM THE SECONDARY TO THE PRIMARY WORK FORCE
CONSTRUCTION WORKER PROFILE, ROCK SPRINGS AND GREEN RIVER 1975

Current Occupation	Previous Occupation
Boiler Maker	Rigger
Steam Fitter--Welder	Navy
Carpenter	Student
Boiler Maker	Teacher
Maintenance	Maintenance--mechanic
Boiler Maker	Boiler Maker--insurance salesman
Carpenter	Meat cutter
Operating Engineer	Operating Engineer
Iron Worker	Teacher
Pipefitter--Welder	Pipefitter
Electrician	Carpenter
Electrician	Purchasing Agent
Iron Worker--Minister	Mobile Home Assembly
Plumber	Plumber
Instrument Engineer	Instrument Fitter
Civil Engineer	Stock Broker
Sheet Metal Worker	Electrician
Pipefitter--Welder	--------
Laborer--Clean-Up	Clean-Up
Electrician	Electrician
Plumber	Plumber
Derrick Hand	Carpenter
Driller Helper	Car Renovator
Oil Rig Roughneck	Janitor
Oil Rig Roughneck	Crate Unpacker
Engineer	Engineer
Crane Operator	Shuttle Car Operator
Sheet Metal Worker	Carpenter
Boiler Maker	Laborer--Construction
Pipeline Laborer	Laborer--Construction
Office Manager--Construction	Accountant
Piping Superintendent	General Foreman--Construction
Engineer	Student
Accountant	Student
District Supervisor	Student
Secretary	Bank Teller
Welder	Owned Mud Hauling Co.
Foreman--Construction	Foreman
Runs Oil Rig Testers	Driller
Carpenter's Helper	Sales
Carpenter	Carpenter
Iron Worker	Student
Carpenter	Carpenter
Laborer--Construction	Highway Dept. Laborer
Carpenter	Student
Pipefitter	Pipefitter

CONT.

Current Occupation	Previous Occupation
Boiler Operator	Welder
Equipment Operator	Student
Dispatcher	Jack of all trades
Mechanical Engineer	Student
Keypunch Operator	Clerk Typist
Caterpillar Operator	Foreman
Accountant	Student
Miner--Driver	Tow Boat Deck Hand
Miner--Underground	Guard
Utility Helper--Mining	Marine Corps
Custodian	Laborer
Equipment Operator	Dishwasher Tester--Factory Worker
Miner	Laborer
Management	Mechanical Engineer
Engineer	Student
Chemical Engineer	Student
Chemical Engineer	Armed Services
Operator	Butcher
Maintenance Carpenter	Carpenter
Maintenance	Heavy Duty Mechanic
Electrician	Student
Miner	Truck Driver
Electrician Trainee	Ambulance Driver
Maintenance	Student
Miner	Operator
Miner	Mechanic
Teacher	Student
Mine Maintenance	Heavy Duty Mechanic
Power House Operator	Tester
Instrumentation Electrician	Guided Missile Technician
Personnel Assistant	Salesman
Underground Mechanic	Assembled Cranes and Shovels
Iron Worker	Group Supervisor--Youth Care
Iron Worker	Laborer--Road Construction
Dispatcher--Construction	Student
Assistant Materials Supervisor	Student
Field Engineer--Materials Coordinator	Store Night Manager--Student
Laborer--Foreman	Supervisor--Social Worker
Construction Engineer	Student
Light Equipment Opeator	Health Services Aide
Buyer	Clerk
Mine Roof Bolter	Roofing Houses
Underground Miner	Student
Miner Trainee	Student
Engineer	Engineer
Electrician	Student
Miner	Welder
Mechanic	Union Pacific
Secretary	Housewife
Miner	Student
Miner	Meat Cutter
Miner	Carpenter

CONT.

Current Occupation	Previous Occupation
Carpenter	Carpenter
Laborer	Salesman
Heavy Equipment Operator	Operator
Welder	Truck Driver
Electrical Foreman	Supervisor
Iron Worker--Apprentice	Paint Crewman
Electrician	Electrician
Boiler Maker	Meat Cutter
Boiler Maker	Service Station Attendant
Electrician	Electrician
Mud Hauler--Oil Field	Student
Mechanic	Mechanic
Laborer	Student
Carpenter	Carpenter
Carpenter	Carpenter
Working Foreman	Transportation
Arc Welder	Welder
Electrician	Electrical Constractor
Welder	Welder
Heavy Equipment Operator	Heavy Equipment Operator
Mine Engineer--Surveyor	---
Oil Field Consultant	Superintendent--Housing Project
Truck Driver	Truck Driver
Management Trainee	Teacher
Laborer	Student
Laborer	Air Force
Electrical Engineer	Student
Mining Engineer	Student
Miner	Road Construction
Warehouse Supervisor	Well Tester
Operator	Truck Driver
Loads Pallets	Truck Driver
Power House Operator	Gas Station Attendant
Car Cleaner	Fireman
Rough Neck--Oil Rig	Factory Worker
Operator	Formed Walls--Construction
Industrial Relations Manager (Mine)	Industrial Relations Manager
Track Operator	Truck Driver
Electrician	Farmer
Apprentice--Construction	Laborer--National Park Service
Crane Operator	Heavy Equipment Operator
Miner	Mason
Security Guard	Store Manager
Laborer	Flag Girl
Pipefitter	Laborer
Lineman--Electrician	Lineman--Electrician
Welder--Constructon	Welder--Construction
Mining	Gas Attendant

CONT.

Current Occupation	Previous Occupation
Processing Unit Operator	Driver--Coca Cola
Miner--Mechanic	Student
Miner	Garbage Collector
Miner	Produce Manager
Underground Miner	Truck Driver
Mechanic	Machinist
Utility Operator	Student
Miner	Salesman
Mechanic	Parts Clerk
Plant Engineer	Design Engineer
Employment Supervisor	USAF Capt.
Miner	Laborer
Carpenter	Carpenter
Laborer--Construction	Laborer
Electrician--Construction	Electrician
Miner	Carpenter
Miner	Clerk
Truck Driver	Heavy Equipment Operator
First aid Man	Medic USN
Laborer--Power Plant	Student
Equipment Operator--Construction	Highway Patrolman
Engineer	Armed Services
Dirt Foreman	Picked up Mail
Plant Machinery Operator	Student
Underground Mechanic	Welder
Loading Dock Foreman	Laborer
Mechanic	Grinder Polisher
Warehouse Supervisor	Well Tester
Operator	Truck Driver
Loads Pallets	Truck Driver
Power House Operator	Gas Station Attendant
Car Cleaner (mine)	Fireman